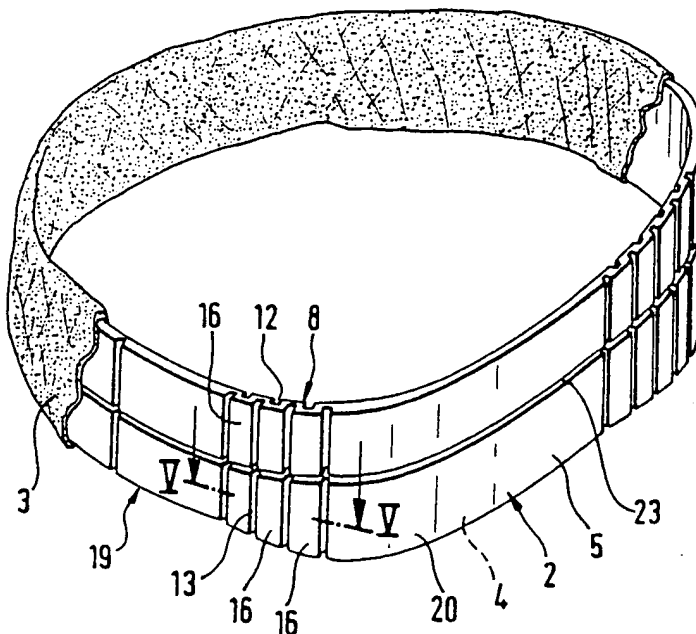




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: HEAD GUARD, PREFERABLY ANNULAR BROW-BAND, AND METHOD FOR MANUFACTURING SUCH A HEAD GUARD.		
(57) Abstract <p>A head guard, preferably annular brow-band, comprising a longitudinal, preferably annular unit (2) which completely or substantially is made of cellular plastic. In order to ensure that all parts of the head guard provide adequate protection, the cellular-plastic unit (2) has depressions (12, 13) which protrude into the cellular-plastic material alternately from an inner side (14a) and an outer side (14b) respectively, of the unit, which inner side (14a) and outer side (14b) respectively, is adapted to face inwards towards and outwards from the head (15) respectively, whereby the depressions (12,13) define cellular-plastic pads (16) with shock-absorbing properties and extending substantially transverse to the longitudinal direction (L) of the cellular-plastic unit (2) and whereby said cellular-plastic pads (16) and the connecting portions (17) connecting said pads together permit a limited stretching or elongation of the cellular-plastic unit (2) in its longitudinal direction (L) for providing at least one elastic portion (8-11) for adaptation of the size and/or shape of the cellular-plastic unit (2) to the size and/or shape of the head (15). A simple and efficient method for manufacturing the cellular-plastic unit (2), includes pressing heated blades (24, 25) into the cellular-plastic unit (2) to provide depressions (12, 13) therein and bringing warm processing means in contact with other parts of the cellular-plastic unit such that said unit gets a surface which is less porous than the parts thereof lying within said surface.</p>		



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Head guard, preferably annular brow-band, and method for manufacturing such a head guard.

The present invention relates to a head guard, preferably in the form of an annular brow-band comprising a longitudinal, preferably annular unit, which completely or substantially is made of cellular plastic. The invention also relates to a method for manufacturing such a head guard.

In DE-A1-30 05 001 there is described a head guard comprising plates of cellular plastic provided in a stocking of elastic material. The stocking is sewn together between the plates and it permits stretching of the head guard for adaptation thereof to the size of the head. A problem at such head guards is however that there are unprotected spaces between the plates and that the width of these unprotected spaces increases with the stretching of the head guard.

The object of the present invention is to eliminate this problem and to obviate unprotected spaces at head guards of the abovementioned type. This is arrived at according to the invention by means of the characterizing features of claim 1.

Another object is to provide a simple and efficient method for manufacturing the head guard in question and this method is defined in the characterizing part of claim 10.

The invention will be further described below with reference to the accompanying drawings, in which

fig. 1 is a perspective view of the head guard according to the invention in the form of an annular brow-band placed in working position around the head of a person;
fig. 2 is an enlarged view of the head guard of fig 1;
fig. 3 is a plan view of a cellular-plastic unit forming part of the head guard of fig. 1 in extended condition;

fig. 4 is a view IV-IV of the cellular-plastic unit of fig. 3;

fig. 5 is a section V-V through the head guard of fig. 2;

fig. 6 is a section corresponding to fig. 5 through the head guard in a more stretched condition;

5 fig. 7 illustrates a portion of the cellular-plastic unit forming part of the head guard during a manufacturing step; and

fig. 8 finally, illustrates a head guard according to fig. 1 in folded condition.

10 The illustrated head guard has the shape of an annular brow-band 1, comprising a cellular-plastic unit 2 and a cover 3 of suitable material, e.g. a textile material, preferably in the form of a terry-cloth stocking. The cellular-plastic unit 2 is entirely or substantially made of a
15 cellular-plastic material, e.g. polyethylene, whereby the inner portions 4 of the unit 2 preferably consist of expanded polyethylene and a surface 5 of unexpanded polyethylene or polyethylene which in another way has been made less porous than said inner portions 4. The cellular-plastic
20 unit 2 further comprises a longitudinal band of cellular plastic (see fig. 3), the end portions 6, 7 of which have been glued or otherwise put together to provide the annular shape. In the embodiment shown, the unit 2 of cellular plastic is provided with four adjustment portions 8, 9 and
25 10, 11 respectively. Each adjustment portion 8 or 9 includes depressions 12, 13 provided in the cellular-plastic unit 2, whereby the depressions 12, 13 protrude into said unit alternately from an inner side 14a and an outer side 14b respectively, of the unit 2. Thus, the depressions 12
30 protrude from that inner side 14a of the cellular-plastic unit 2 which is adapted to face inwards towards the head 15 of the person wearing the head guard. The depressions 13 however, protrude from that outer side 14b which is adapted to face outwards from the head 15. The depressions
35 12, 13 define pads 16 of cellular plastic, whereby each pair of adjacent depressions 12, 13 defines a cellular-plastic pad 16. Thus, the adjustment portions 8, 9 have six such cellular-plastic pads 16, while the adjustment

portions 10 and 11 include eight cellular-plastic pads 16. The depressions 12, 13 protrude into the cellular-plastic unit 2 substantially in transverse direction relative to the longitudinal direction L of said unit 5 (see fig. 4), and the cellular-plastic pads 16 also extend substantially in this transverse direction T (see fig. 4) relative to the longitudinal direction L.

Since the unit 2 is made of an elastic cellular-plastic material and the pads 16, as well as the connecting portions 17 connecting said pads together also consist of such elastic material, the pads and the connecting portions permit a limited stretching or elongation of the unit 2 in its longitudinal direction. The depressions 12, 13 see to that the adjustment portions 8-11 15 provide less resistance to stretching of the cellular-plastic unit 2 than other portions of the unit, but the degree of stretching is limited while the connecting portions 17 and the cellular-plastic pads 16 see to that said pads can not "lay down" such that they extend substantially in the longitudinal direction L of the cellular-plastic unit 2 instead of substantially in its transverse direction TR. A maximally stretched adjustment portion 8 is shown in fig. 6, from which it appears that the cellular-plastic pads 16 of said adjustment portion 8 20 still extend substantially in the transverse direction TR. 25

By means of said stretching ability of the adjustment portions 8-11, the head guard is easy adaptable to the size and/or shape of the head 15 while maintaining the required protective effect therearound. Due to the 30 elastic properties of the adjustment portions 8-11, it is also ensured that the head guard is kept in position around the head 15 with a steady grip.

In order to ensure that in many embodiments of the head guard, the adjustment portions 8-11 maintain the required protective effect when stretched, the adjustment 35 portions are preferably maximally stretchable until their width B (see fig. 6) is reduced by half B1 at the most (see fig. 6).

The depressions 12, 13 are tapering preferably in the direction into the cellular-plastic unit 2. While e.g. the inner depressions 12 have such a shape, the inner side 14a of the length of the adjustment portions 8-11 in the longitudinal direction L of the cellular-plastic unit 2 may decrease by changing the shape of the cellular-plastic unit 2 such that the originally "gaping" depressions 12 are closed (see fig. 5). This is advantageous since hereby, the head guard is better adapted to heads 15 of small size.

10 The inner depressions 12 preferably have a length L1 which is equal to or larger than half the width B of the adjustment portions 8-11 when said portions are not stretched. The outer depressions 13 however, are preferably of a length L2 equal to or smaller than half the width B of the adjustment portions 8-11 when said portions are not stretched. Hereby, the adjustment portions 8-11 attains a frequently very advantageous combination; maximum stretch/favourable protective effect/favourable elasticity.

The pads 16 of cellular plastic are preferably as 20 thick or almost as thick (T in fig. 4) as their height (B in fig. 4) when the adjustment portions are not stretched. Additionally, each cellular-plastic pad 16 preferably has an outer planar or substantially planar stopping portion 18a and an inner planar or substantially planar support 25 portion 18b, whereby at least a part of the stopping portion 18a, seen from the outside, is positioned straight outside at least a part of the support portion 18b (see e.g. fig. 4). Such an embodiment of the cellular-plastic pads 16 in most cases also sees to that the adjustment portions 8-11 get a very advantageous protective effect. 30

The cellular-plastic unit 2 of the illustrated brow-band in the shape of a longitudinal strip, comprises a protective portion 19 adapted for protecting the brow and positioned between the adjustment portions 8 and 9, two 35 protective portions 20 and 21 for the temples positioned between the adjustment portions 8 and 10 and 9 and 11 respectively, and a protective portion 22 for the back of the head defined by the end portions 6, 7 of the strip when

attached to each other. These protective portions 19-22 preferably lack transverse or substantially transverse depressions and are therefore less elastic than the adjustment portions 8-11. The strip preferably has the same
5 width B in unstretched condition, which means that the adjustment as well as protective portions 8-11 and 19-22 respectively, also have the same width B in unstretched condition.

In order to that the head guard preferably shall
10 have a rather large height H (see fig. 3) and also be able to adapt to the head 15 such that it follows the flexure of the head, the cellular-plastic unit 2 is preferably provided with at least one longitudinal depression 23, which preferably extend along the entire or at least the major
15 part of the cellular-plastic unit 2. This depression 23 protrudes into the cellular-plastic unit 2 from the outside 14b thereof and it preferably has a length which is equal to or less than half the width B of said unit 2.

This longitudinal depression 23 preferably extends
20 in the center or substantially in the center of the cellular-plastic unit 2, whereby said unit easily "folds" somewhat in the middle in order to better adapt to the shape of the head 15.

The cellular-plastic unit 2 and especially its adjustment portions 8-11 as well as the cover 3 permits folding
25 of the brow-band (see fig. 8) so that it can be put away, e.g. in the pocket, when not used.

The brow-band described above has a very low weight, is adaptable to heads of various size, follows exactly
30 the shape of the head, sits firmly on the head, provides good protection therearound and is easy to fold and/or roll and put away after use.

The head guard according to the invention may be manufactured in different ways, whereby an especially suitable method of manufacture is carried out by pressing
35 heated blades 24, 25 into a cellular-plastic unit 2 with preferably uniform width for providing depressions 12, 13 (see fig. 7). Other portions of the cellular-plastic unit 2

are subjected to warm processing means 26, 27 such that said unit 2 gets a surface which is less porous than the parts lying within said surface. Due to this method the cellular-plastic unit 2 gets a protective surface which
5 successively, i.e. without a sharp transition, transcend into more porous parts of the unit within said surface.

For manufacturing the cellular-plastic unit according to the above principles, various types of heatable devices may be used. The processing means 26 and the blades
10 24 may e.g. be formed by a heatable jaw 28 and the processing means 27 and the blades 25 by another heatable jaw 29. These jaws 28, 29 are preferably moveable towards each other (see arrows 30 and 31 respectively in fig. 7). The manufacturing proceeds in this case such that e.g. a cellular-plastic unit 2 with entirely uniform width and without
15 depressions is positioned between the jaws 28, 29. These jaws are brought together in heated condition, whereby they form the depressions in the cellular-plastic unit 2 and subject its surface to heat so that this surface becomes
20 less porous than other parts of the unit.

The brow-band described above is a suitable variant of the head guard of the invention and the manufacture described above is advantageous in many ways. However, the invention may vary within the scope of the following
25 claims in view of its shape as well as of its use. Thus, certain parts of the cellular-plastic unit may be of another material than cellular plastic and/or another material e.g. of reinforcement steel may be embedded in the cellular plastic. The cellular-plastic material may be of another
30 type than polyethylene and a possible variant is that the unit throughout is made of expanded cellular plastic without especially hardened or otherwise differing surface. It is also possible to provide the cellular-plastic unit with a rather hard surface which either successively trans-
35 cends into softer cellular-plastic material or forms an outer layer to softer cellular-plastic material. Each adjustment portion may have an optional number of cellular-plastic pads positioned beside each other and the number

of adjustment portions may be one or more. Alternatively, it is possible to design the head guard with an all-around adjustment portion, i.e. without protective portion or portions, whereby this single adjustment portion however, eventually may be interrupted at any point or points. The depressions may have another length than described above and the height and/or width of the cellular-plastic pads may be another than stated. The stopping and support portions of the cellular-plastic pads may also have another shape than described and their mutual position may eventually vary from what is described.

The cellular-plastic unit may have a uniform width in unstretched condition as stated, but its width may vary along its length if this is preferred in any embodiment. In the same manner the height of the head guard may vary along its length.

The head guard may be a brow-band with a cover of another suitable material and another suitable shape than a terry-cloth stocking. The head guard however, may alternatively be an annular band provided in a cap which is folded around the band. Hereby, the band is completely covered by the cap and have the same advantageous properties as a free-lying brow-band. Another possible variant is that the head guard forms part of a helmet which completely or partially extends up above the head.

Claims:

1. Head guard, preferably annular brow-band, comprising a longitudinal, preferably annular unit (2) which completely or substantially is made of cellular plastic, characterized in that the cellular-plastic unit (2) has depressions (12, 13) which protrude into the cellular-plastic material alternately from an inner side (14a) and an outer side (14b) respectively, of the unit, which inner side (14a) and outer side (14b) respectively, is adapted to face inwards towards and outwards from the head (15) respectively, whereby the depressions (12, 13) define cellular-plastic pads (16) with shock-absorbing properties and extending substantially transverse to the longitudinal direction (L) of the cellular-plastic unit (2) and whereby said cellular-plastic pads (16) and the connecting portions (17) connecting said pads together permit a limited stretching or elongation of the cellular-plastic unit (2) in its longitudinal direction (L) for providing at least one elastic portion (8-11) for adaptation of the size and/or shape of the cellular-plastic unit (2) to the size and/or shape of the head (15).
2. Head guard according to claim 1, characterized in that the adjustment portion (8-11) is maximally stretchable in the longitudinal direction (L) of the cellular-plastic unit (2) until its original width (B) has been reduced by half (B1) at the most.
3. Head guard according to claim 1 or 2, characterized in that the depressions (12, 13) are tapering in the direction into the cellular-plastic unit (2), whereby the depressions (12) protruding into the cellular-plastic unit (2) from the inside (14a) have a length (L1) which is equal to or larger than half the width (B) of the adjustment portion (8-11) when said portion is unstretched, and whereby the depressions (13) protruding into the cellular-plastic unit (2) from the outside (14b) have a length (L2) which is equal to or less than half the width (B) of the adjustment portion (8-11) when said por-

tion is unstretched.

4. Head guard according to any preceding claim,
c h a r a c t e r i z e d i n that the cellular-plastic
pads (16) are as thick or substantially as thick (T) as
5 their height (B) when the adjustment portion (8-11) is
unstretched and that each cellular-plastic pad has an
outer planar or substantially planar stopping portion (18a)
and an inner planar or substantially planar support por-
tion (18b), whereby at least a part of the stopping por-
10 tion (18a), seen from the outside, is positioned straight
outside at least a part of the support portion (18b).

5. Head guard according to any preceding claim,
c h a r a c t e r i z e d i n that the cellular plas-
tic unit (2) except at least one adjustment portion (8-11)
15 also includes at least one protective portion (19-22),
whereby the parts providing the adjustment and protective
portions (8-11 and 19-22) of the cellular-plastic unit
(2) in unstretched condition have the same or substantially
the same width (B).

20 6. Head guard according to any preceding claim,
c h a r a c t e r i z e d i n that the cellular-plastic
unit (2) consists of a longitudinal strip which may be
joined to an annular brow-band comprising one protective
portion (19) for the brow, one protective portion (22)
25 for the back of the head (15), two protective portions
(20, 21) for protecting the temples and four adjustment
portions (8-11) provided between said protective portions
(19-22).

7. Head guard according to any preceding claim,
30 c h a r a c t e r i z e d i n that the cellular-plastic
unit (2) has at least one longitudinal depression (23)
which protrudes into the unit from the outside (14b) there-
of and which is provided to facilitate adaptation of the
head guard to the head (15).

35 8. Head guard according to any preceding claim,
c h a r a c t e r i z e d i n that the cellular-plastic
unit (2) consists of expanded cellular plastic with a sur-
face of unexpanded cellular plastic, whereby the surface

of unexpanded cellular plastic successively transcend into the expanded cellular plastic, and whereby the cellular-plastic unit (2) is elastic and the unexpanded cellular-plastic surface provides protection for the expanded
5 cellular-plastic material within said surface.

9. Head guard according to any preceding claim, characterized in that the cellular-plastic unit (2) has a cover (3) of textile material, whereby the cover preferably consists of a terry-cloth stocking, and
10 that the adjustment portions (8-11) of the cellular-plastic unit (2) and the cover (3) permit folding of the head guard.

10. A method for manufacturing a head guard, preferably an annular brow-band, comprising a longitudinal, preferably
15 annular unit (2) which completely or substantially is made of a cellular plastic, according to claim 1, characterized by pressing heated blades (24, 25) into the cellular-plastic unit (2) to provide depressions (12, 13) therein and bringing warm processing means (26, 27)
20 in contact with other parts of the cellular-plastic unit such that said unit gets a surface which is less porous than the parts thereof lying within said surface.

1 / 4

Fig. 1

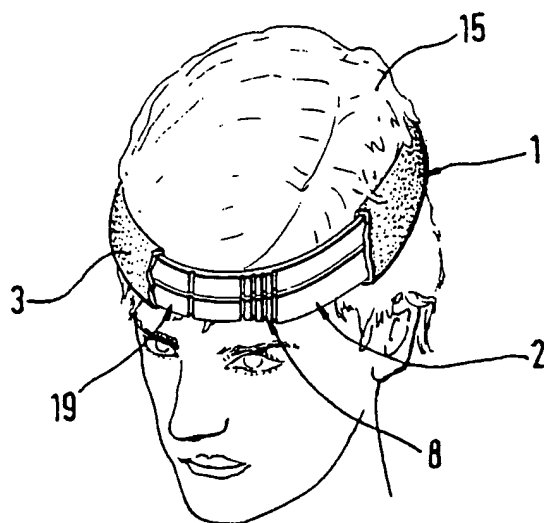


Fig. 2

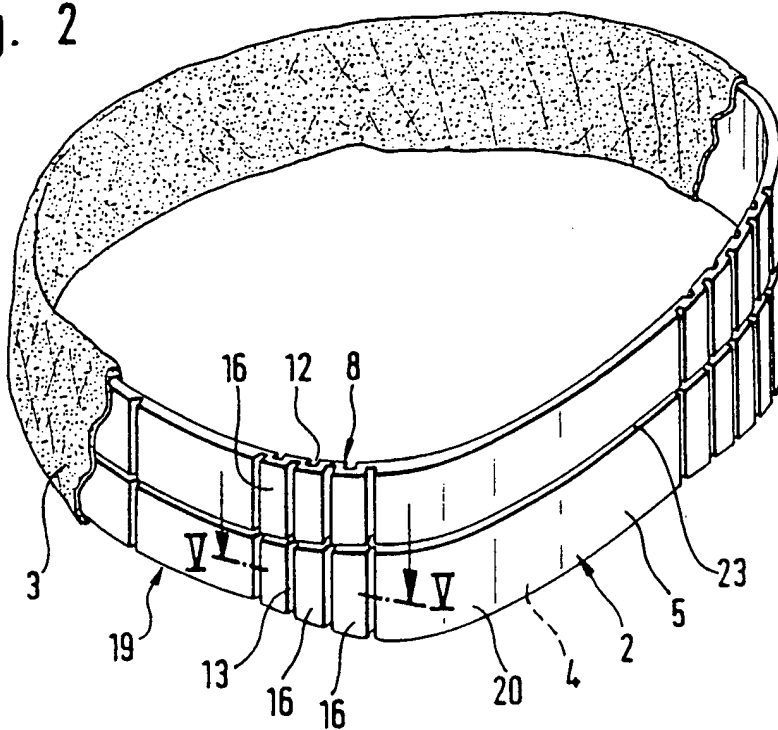


Fig. 8

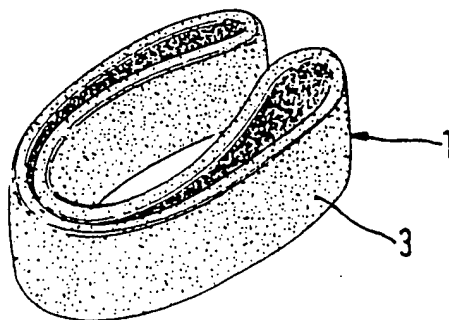
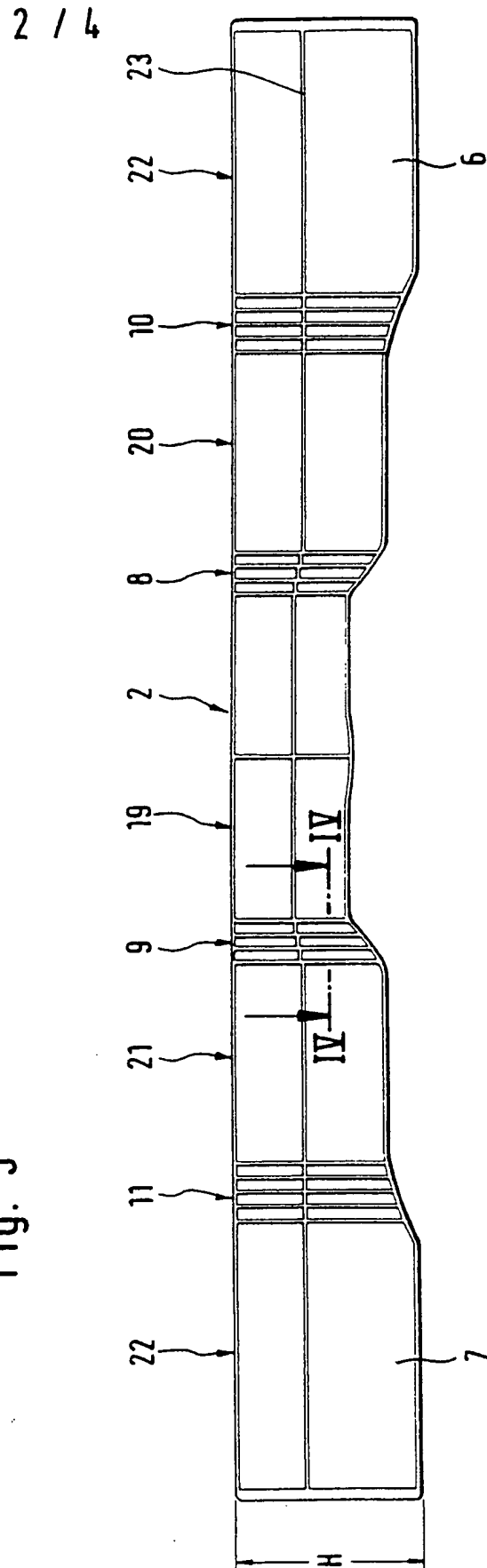


Fig. 3



3 / 4

Fig. 4

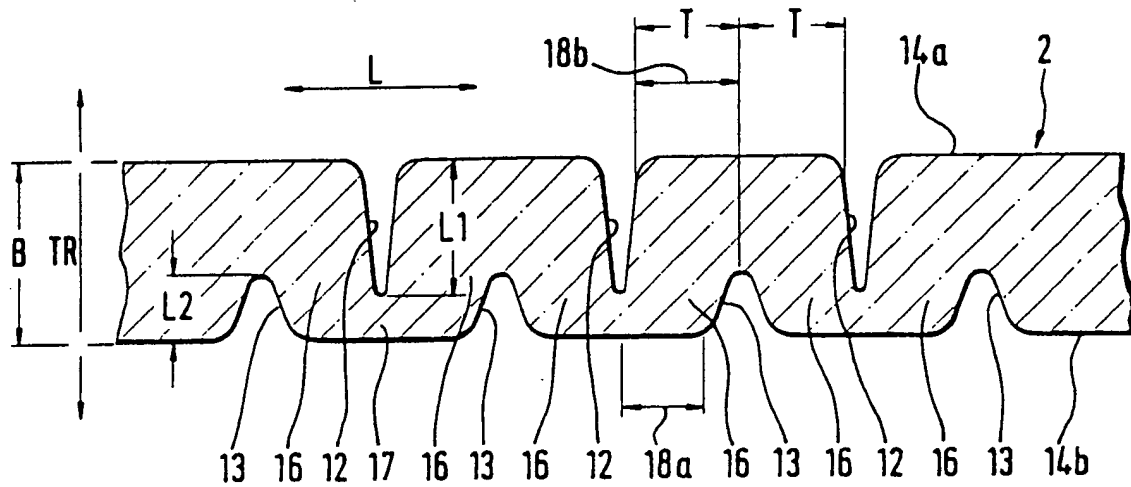
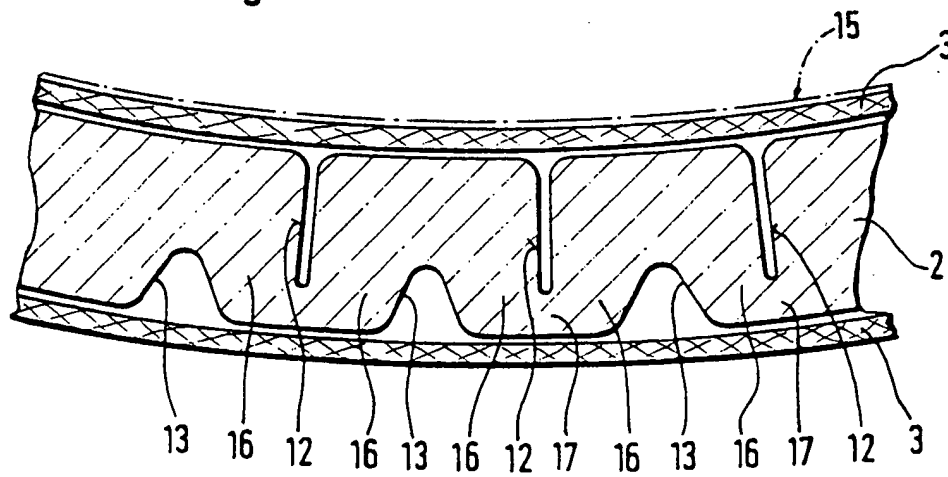


Fig. 5



4 / 4

Fig. 6

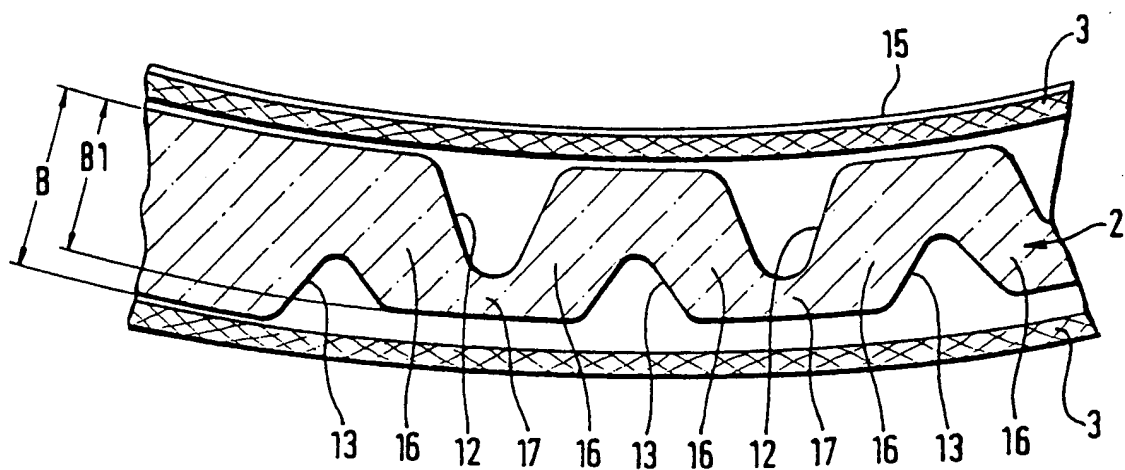
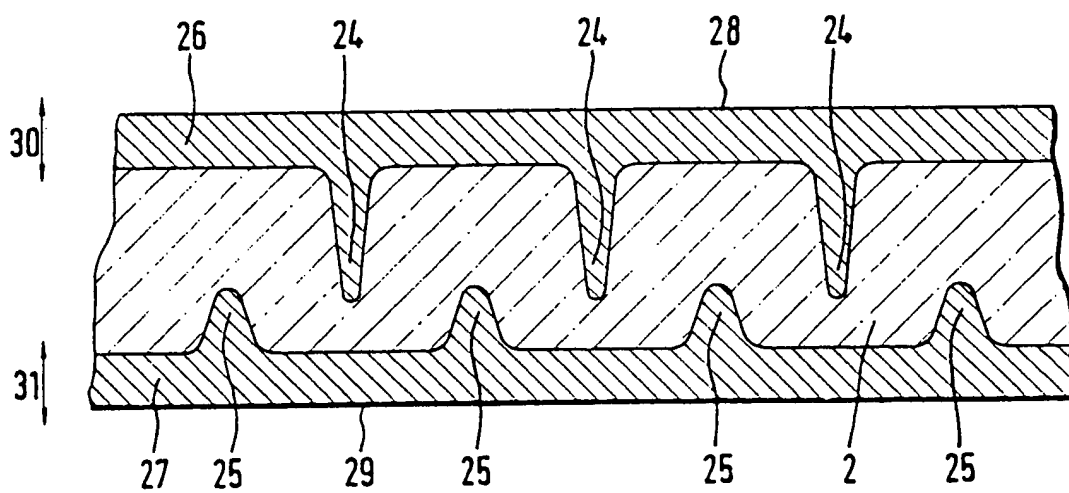
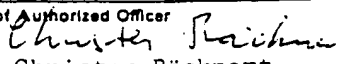


Fig. 7



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE87/00592

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
A 63 B 71/10		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC 4	A 42 B 1/00. /08, /10, /22, 3/00-/02; A 63 B 71/08, /10; A 41 D 13/00	
US C1	2: 171, 181, 181.8, 182.3, 183, 410-418	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched ⁸		
SE, NO, DK, FI classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	DE, A1, 3 005 001 (SALCHOW W) 20 August 1981	
A	FR, A1, 2 305 205 (OLIBET J) 22 October 1976	
A	US, A, 662 645 (HALBERT F.E.) 27 November 1900	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁴ Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the International filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
1988-02-29		1988 -03- 0 1
International Searching Authority		Signature of Authorized Officer
Swedish Patent Office		 Christer Bäcknert